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(54) Dual Damascene process having tapered vias

(57) A process for forming a dual-damascene interconnect employs a spun-on organic layer above an interlayer dielectric having a set of apertures for vias that forms tapered regions about the apertures without penetrating the apertures. The slope of the tapered regions is transferred during the etching process to form self-aligned tapered vias. A silicon substrate (10) over which an oxide or other insulating layer (110) is first formed. A layer first level of metal interconnect (120) and a layer of SiO_2 (130) are formed insequent onto the structure, then an aperture (140) extending down to and stopping on metal interconnect layer is formed. Now an anti-reflective coating (ARC) layer (135) is put down and spun onto the structure. Unexpectedly, the surface tension of the ARC layer prevents the ARC material from getting into the aperture but forms a tapered rim at its edge (as illustrated). After baking the ARC layer, a layer of resist (150) is deposited, exposed, and developed to form a novel aperture (142). An non-isotropic etch using CF_4/O_2 chemistry as the etching gas is performed, then both the resist and ARC layer are stripped. The result is an aperture having a tapered bottom selection which, when filled with metal (147/147) and polished to become level with the top of SiO_2 layer produces the chemical Damascene interconnect.

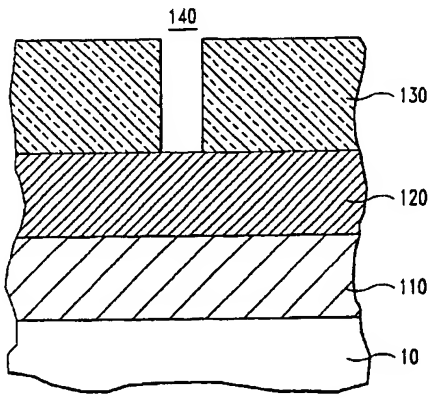

FIG. 1A

EP 0 747 947 A3

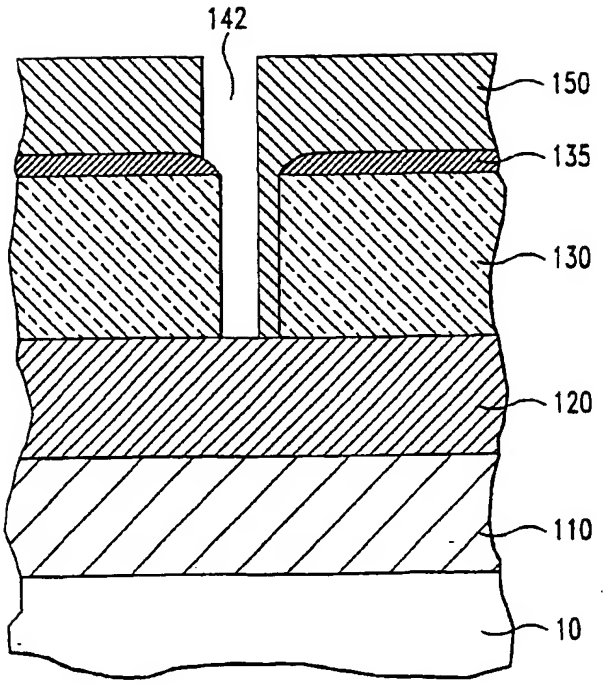

FIG. 1B

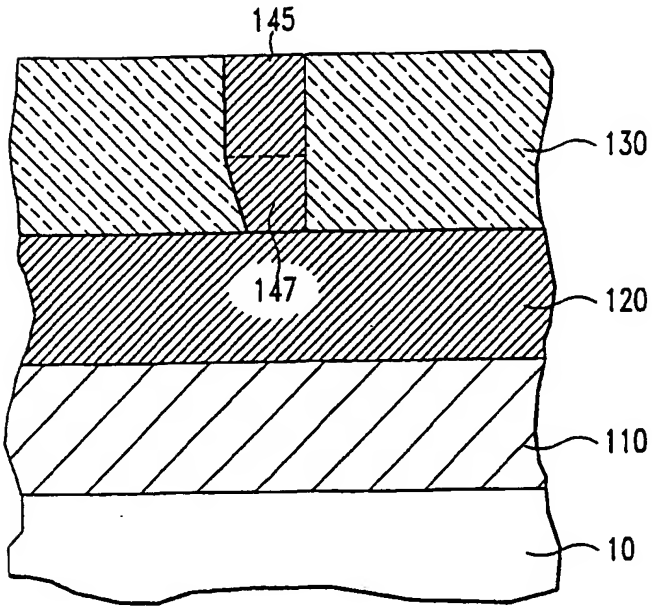

FIG. 1c

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EUROPEAN SEARCH REPORT

Application Number
EP 96 48 0062

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	PATENT ABSTRACTS OF JAPAN vol. 010, no. 129 (E-403), 14 May 1986 & JP-A-60 261141 (ROOMU KK), 24 December 1985, * abstract *	1	H01L21/768
A	EP-A-0 529 321 (APPLIED MATERIALS INC) 3 March 1993 * column 1, line 45 - column 1, line 58 * * column 2, line 40 - column 5, line 21 * * column 1, paragraph 1; claims 1-15; figure 1 *	3,4	
D,A	US-A-4 461 672 (MUSSER MARY E) 24 July 1984 * the wole document *	1	
D,A	US-A-5 173 442 (CAREY DAVID H) 22 December 1992 * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			H01L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	9 January 1997	Königstein, C

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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